A pilot study of wound healing following surgical excision of pilonidal sinus

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Pilonidal sinus (PS) is a painful, chronic condition with a high re-occurrence rate. This prospective, descriptive pilot study followed 15 consenting patients who had surgery for PS excision over 12 weeks postoperatively. Changes in their wounds were monitored with the AMWIS digital imaging system. Participants completed surveys recording their demographic details, wound characteristics and treatment, and impacts of PS on their lives including pain, level of embarrassment and effects on activities. Results: Eight patients (53%) reported their wounds had healed at 12 weeks. Wound healing rates varied widely but did not appear to correspond to wound area or dressings used. Impacts of PS on participants' usual activities at 2-3 weeks were rated as minor for 40% (n=6) of respondents and moderate to severe for one third (n=5). Most respondents indicated decreased participation in sports, particularly swimming. At 12 weeks, 62% (n=8) reported no impacts and two reported moderate to severe impacts, including inability to sit the HSC examination. Both of these latter respondents had unhealed wounds. Embarrassment levels were low for all respondents at both time periods (mean=1.5 and 1.3, respectively, median=1). The topography of the sacrococcygeal area presented a challenge for reproducible digital imaging. The sample size is too small for generalisation, however this pilot demonstrates the feasibility of using the data collection instruments and procedure in a larger study.

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Background

A pilonidal sinus (PS) is a short track under the skin usually found in the sacrococcygeal area (Lewis et al 2000 p1188). The condition is considered to be caused by damaged hair follicles and entrapped hair leading to folliculitis, infection and rupture into surrounding subcutaneous tissue (Aydede et al 2001). Pilonidal Sinus is a 'disabling' (Abu Galala et al 1999 p165) painful, chronic condition (Banerjee 1999, Testini et al 2001) with a high re-occurrence rate (Viciano et al 2000).

There is considerable debate about the most appropriate and effective surgical management (Senapati et al 2000, Banerjee 1999, Hakan & Mehmet 1998). Conservative management recommends shaving the perineal area (Armstrong & Barcia 1994) while McVey (1999) suggests wearing cotton underwear, avoiding tight jeans and eating a balanced diet. Another contentious issue is the dressing management of an excised PS. No difference in healing time was found when wounds were dressed with gauze and povidone iodine or hydrocolloid dressings (Viciano et al 2000) or polyurethane foam and calcium alginate (Berry et al 1996). Nurses attending wound dressings have little definitive evidence to guide their practice, although it is known that effective wound management reduces the risk of infection resulting in a shorter healing time. However, treatments often disrupt patients' lives, delaying their return to work (McVey 1999).

This prospective, descriptive, longitudinal study followed a sample of the population who underwent sacrococcygeal sinus surgery, in order to identify risk factors and extend clinical understanding of this chronic condition. Optimum wound healing rates are infrequently achieved in this population (Aydede et al 2001) and improved understanding of the condition will support nurses' decision making about treatment options.

Aim

This pilot study aimed to establish the practicality and validity of a technique for determining healing rates and patient perceptions following excision of pilonidal sinus.

Method

Design

A prospective, descriptive design was used to identify post-surgical wound characteristics and the management of patients following excision of a pilonidal sacrococcygeal sinus. The study was approved by the South East Sydney Area Health Service Ethics Committee - Southern Branch.

Participants

All patients for excision of sacrococcygeal PS at The Sutherland Hospital and The St George Public and Private Hospitals were invited to participate.

The pilot study comprised 15 patients. Participants were primarily male, Caucasian and moderately hirsute. Seven (47%) were aged less than 20 years. One man reported having diabetes mellitus. Five had their wounds digitally photographed postoperatively; three were not seen in hospital but their wounds were photographed at one week postoperatively; 12 were photographed at 2-3 weeks postoperatively and five at 12 weeks.

Table 1: Demographic information on the 15 participants

Age	16-37 years	mean 22	median 19
Gender	12 men	3 women	
Body Hair	3 minimal	10 moderate	1 prolific
Skin Colour	14 pale	1 light brown	

Instruments

Digital photographs were taken on three occasions: postoperatively (in hospital or in the community clinic), at 2-3 weeks and again at 12 weeks if the wound was not healed. The Alfred/Medseed Wound Imaging System (AMWIS) was used to analyse digital images, calculating wound area and depth (Austin & Santamaria 2002).

Participants were surveyed on these three occasions. Pain/discomfort was measured using a visual analogue scale numbered from 0 to 10 with verbal anchors ('no pain' to 'worst possible pain'). This instrument has established validity and reliability (McCaffery & Pasero 1999). Levels of embarrassment were measured with the seven-point numerical scale used by Lodge et al (1997) with verbal anchors ('not at all embarrassed' to 'very embarrassed'). Levels of disruption to the individuals' activities were measured with a five-point Likert scale used by Stewart (2001) with verbal anchors (1='definitely no' through 5='definitely yes').

Other information collected in hospital included patient demographics, type of surgery undertaken, a short history of the participant's condition and treatment undertaken (including medications).

At 2-3 weeks postoperatively and at 12 weeks, participants were re-surveyed concerning their degree of pain, embarrassment, impacts on activities and wound treatment related to their PS (including clothing worn).

Procedure

Pre-admission clinic staff informed the research team when patients were admitted for surgery. In addition the team regularly surveyed operating lists and/or referrals to community health services. Potential participants were approached prior to surgery and invited to participate. Other participants were recruited post-operatively at home at the time of the first community health nurse visit and informed consent obtained.

Data were collected for the first time post operatively in hospital or at the first dressing change in the community. Digital photographs of the wound were taken. Participants lay on a flat surface in a prone position and used their hands to spread their buttocks to expose the full extent of the wound. Nurses assisted them when necessary. A one centimetre square placed next to the wound was used to calibrate the photograph.

Participants completed a questionnaire, assisted by the nurse. Community health nurses continued wound care between data collection points.

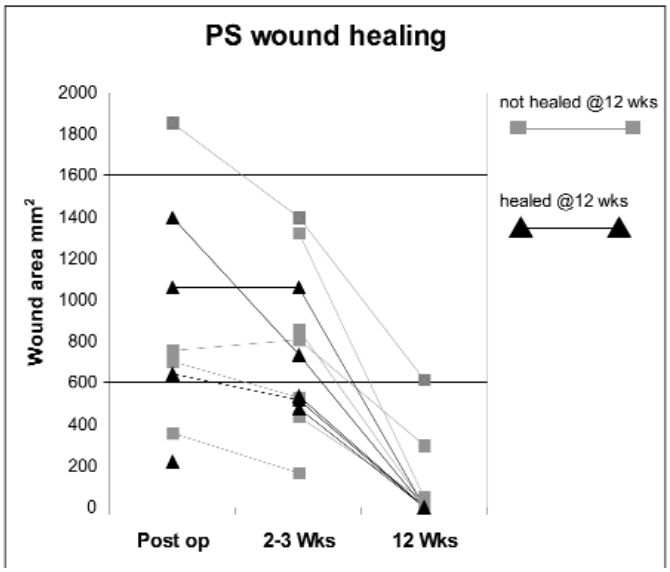
A second set of data was collected approximately two to three weeks after surgery. Participants completed surveys and their wounds were photographed again.

The third data collection was conducted 12 weeks after surgery. Participants with open wounds continued to receive wound care by the community health nurse. Appointments were made to meet with the patient during the dressing change. Participants completed a third survey and the wound was photographed.

Participants no longer receiving community health nurse support for wound management were contacted by phone. Patients with intact wounds completed the questionnaire by telephone. For participants whose wounds had not healed, an appointment was made to meet with a researcher during the dressing change. The questionnaire was completed by participants and digital photos taken by researchers.

Digital photographs were loaded into the AMWIS. Images were calibrated and digitised by an experienced operator, and

Fig. 2: Lines representing participants' change in wound area(mm²) over 12 weeks



wound area data were exported to a Microsoft Excel database. Survey data were entered into an Access database.

Results

Wound characteristics

Eleven wounds were left open at time of surgery. Four wounds were sutured closed. Two of the closed wounds broke down postoperatively and were treated as open wounds. At 12 weeks, eight wounds were healed (53%) and seven were still open (47%). Wound area was calculated from digital photographs taken at the three time intervals. For wounds healed at 12 weeks, wound area was estimated as 0. Figure 2 illustrates the changes in wound area for those that healed and those that remained open.

There were no clear differences in healing between larger and smaller wounds. Six wounds had areas of tissue characterised as 'slough' surrounding the aperture at the postoperative assessment; one of these and two others had areas of slough at 2-3 weeks. There was no clear relation between sloughy tissue and healing at 12 weeks.

Healing rate

The mean time from surgery to healing was 73.6 days (range 51 - 104; median 64) for open wounds. Healing rates were calculated for 14 patients, expressed as percent reduction in wound size from the earliest measurement divided by time in weeks between the two measurements. For participants whose wounds healed, the mean weekly decrease in area was 9.3% (range 0% - 14.0%) until the 12-week assessment. For those whose wounds did not heal, the rate was 7.5% (3.6% - 12.0%) (see Table 2).

Previous treatments

Eight participants reported that their general medical practitioners gave them antibiotics prior to their hospitalisation. Five of these (62.5%) were healed at 12 weeks. Three participants had their lesions drained by the general practitioner, two receiving antibiotics as well, and all of these were healed at 12 weeks.

Table 2: Percent change in wound area (mm²) by week

	Healed @12 weeks	Not healed @12 weeks
n	7	7
Mean	9.3%	7.5%
Std. Dev.	4.9%	3.5%
Minimum	0.0%	3.6%
Maximum	14.0%	12.0%

Antibiotic therapy during the study

Six participants were given antibiotics during the course of the study. One (a diabetic) received postoperative antibiotics. Of two who had antibiotics at 2-3 weeks, one was healed at 12 weeks. Three participants with open wounds at 12 weeks were on antibiotic therapy.

Dressings

At the postoperative interview, six participants were dressing their open wounds with saline gauze. The remainder used tulle gras, calcium alginate, hydrofibre, Combiderm™ and tulle gras and brown sugar. At 2-3 weeks, two participants were using saline gauze; four used calcium alginate and four, used hydrofibre. The same three dressings were used at 12 weeks. The majority of participants (n=12) experienced alterations to the dressings used in their wound management. Dressings appear unrelated to healing of the wound.

Pain intensity

Pain intensity scores were recorded on a 0-10 visual analog scale (VAS) at the three times, measured during dressing change, on movement and at rest. Pain scores were generally low at all time points, however two reported pain at the high end of 'moderate' at rest and during dressing, and on movement the maximum reported post operative pain was eight, which is classed as 'severe'. Severity of reported pain decreased at 2-3 weeks and 12 weeks with rest and activity. Two participants identified pain at 12 weeks despite having wounds that were healed. Pain scores did not appear to be correlated with wound area, however the sample is too small to generalise.

Table 3: VAS pain scores (0-10)

Time	Post op	2-3 weeks	12 weeks
At rest			
Range	0-6	1-2	0-2
Mean	1.5	0.6	0.5
Median	1	0	0
During dressing			
Range	0-6	1-5	0-2
Mean	2.1	1.2	0.25
Median	2	1	0
On movement			
Range	0-8	0-4	0-3
Mean	2.1	1.1	0.5
Median	1	0.5	0

Embarrassment

Embarrassment due to PS was measured using a one to seven-point Likert scale at the three time intervals. Reported embarrassment scores were elevated when the patients were first aware of their condition and at dressing change post operatively (see Table 4). However, the level of embarrassment reported was reduced at 2-3 weeks. Embarrassment seemed unrelated to pain intensity score, wound area or gender.

Table 4: Embarrassment scores (1-7)

Range	1-5	1-7	1-3	1-2
Mean	2.9	2.8	1.5	1.3
Median	3	2.5	1	1

Disruption of activities

Interruption to activities due to PS was measured using a five-point Likert scale at 2-3 weeks and 12 weeks postoperatively (see Table 5). At 2-3 weeks, participants reported their PS prevented them from playing sport (5/15), going to the gym (4/15), swimming or playing water sports (4/15) and sitting (3/15). One woman said it didn't stop her from engaging in any activities. At 12 weeks seven participants reported no disruptions due to PS; four of these had healed wounds. Two said they were prevented from swimming, one from golf. The participant with the largest wound (1857mm^2 postoperatively and 613mm^2 at 12 weeks) reported that the PS prevented him from sitting the High School Certificate examination; this was the person who rated disruption as five at both time points. Eighty-three percent of participants with healed wounds reported decreased disruption due to PS, compared to 57% of participants with unhealed wounds. Three scores stayed the same and one increased from one to four (unhealed wound).

Table 5: Disruption scores (1-5)

Time	2-3-weeks	12 weeks
Range	1-5	1-5
Mean	2.8	1.8
Median	3	1

There were no clear trends relating disruption scores to embarrassment or pain scores.

Clothing

Participants provided details of the fit, fibre and style of the underclothing worn at 2-3 weeks and 12 weeks. Underwear constructed of natural fibres was most popular (10/15), and similar numbers wore shorts and briefs at the 2-3 week and 12 week time points. One third of participants reported wearing tight fitting underwear at 2-3 weeks (5/15), however at 12 weeks only one wore tight underwear, while 80% of respondents reported medium or loose underwear. At 2-3 weeks, 25% of participants whose wounds subsequently healed and 57% of those who did not heal reported wearing tight underclothing. These numbers are too small for statistical comparison.

Discussion

The small sample size and incompleteness of the data preclude generalising about patterns of healing or the effects of different dressing products. Of the twelve data sets with wound images, only two provided data at all three time points. Healing rates were extrapolated over time, however it cannot be assumed that this rate is uniform over time, and the size of the wound may affect this rate. A larger and more complete sample would enable investigation of these effects.

When wounds that were healed at 12 weeks are compared with wounds that were not healed, the rate of healing (percent decrease in wound area) from the postoperative assessment until the 2-3 week assessment is not markedly different. The small sample size, however, may mask a trend. Wounds with surface area 1000 mm^2 or greater had no less probability of healing than wounds of smaller size (2/8 vs 2/7 respectively). The decrease in wound area from 2-3 weeks to 12 weeks for participants whose wounds did not heal was much smaller than the decrease for those whose wounds did heal, since the area of healed wounds at 12 weeks was estimated as 0. A progressive decrease in wound area was observed over time in all participants.

Demographics and effect of risk factors on healing

Gender or amount of body hair had no apparent association with wound healing at 12 weeks. The median age of participants with unhealed wounds was slightly lower than that of participants whose wounds healed (18 and 21 respectively) which may represent a trend. A larger proportion of those whose wounds healed wore medium-to-loose fitting underwear at 2-3 weeks, which tends to support the conjecture that tight clothing inhibits PS healing. A larger sample size would provide more conclusive evidence. Warmer weather may have influenced participants to wear looser clothing at 12 weeks, rather than considerations to do with their PS.

Antibiotics

While the ability to generalise from these data is limited, preoperative antibiotic therapy seems to have had some benefit in wound healing. The majority of participants who were given antibiotics by their general practitioners had healed wounds at 12 weeks.

Pain, embarrassment and disruption

Most participants reported low pain scores. The postoperative pain scores of patients seen in hospital were markedly lower than those of patients seen in the community, which may indicate the persistence of post-operative anaesthesia or routine postoperative analgesia. This limits the utility of postoperative pain scores and changes in pain scores from postoperative levels as markers of the impact of PS on patients' lives. The preponderance of low scores at 2-3 and 12 weeks seems to indicate that most patients with PS have mild pain. Similarly, mean and median embarrassment scores were below the midpoint of the scale. It would be worthwhile to inquire more specifically why certain participants indicated high levels of embarrassment initially and postoperatively. This information could guide targeted psycho-social interventions. Disruption of activities attracted higher scores than either pain or embarrassment, with nine (60%) scoring above the midpoint of the scale at 2-3 weeks, decreasing to two (13%) at 12 weeks. This may prove to be a more robust measure of the impact of PS on participants' lives than either pain or embarrassment.

Limitations due to technical issues

Operator error and inconsistent photographic techniques were identified during this pilot study. Education and training of staff have been initiated to ensure greater reliability.

The topography of the sacrococcygeal area makes reproducible digital photography a challenge. In the absence of a flat plane, the wound imaging software cannot be utilised to its fullest capacity. Folds can mask the true extent of the wound area. The pilot study has shown that the optimal technique requires two researchers, one to gently separate the buttocks so the wound area is laid open while the other takes the photograph. In addition, the deepest part of the wound will be measured with a calibrated, sterile probe.

Modifications to questionnaires

The survey was modified during the pilot study, resulting in some inconsistent or incomplete data sets. The data collection tools were reviewed extensively, and recommendations made regarding content and wording of questions. Additionally, separate patient and nurses' surveys were introduced to maximise patient responses, in particular to potentially sensitive or embarrassing issues. Future surveys, to be completed by participants without assistance from nurses, will ask about PS impacts on sexual activity and hours of work or school lost due to PS.

Conclusion

These pilot data have proven valuable in identifying problematic aspects of data collection procedures and guiding modifications to data collection instruments. The findings provide insight into the different treatments currently in use, the impacts on patients' lives and the variable healing rates following excision of pilonidal sinuses. Further investigations using this method could yield useful evidence to support clinicians in treating people with PS, maximising postoperative wound healing and preventing recurrence.

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